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Energy Facts: Conserving Energy in Home Hot Water Use

Michigan State University

Cooperative Extension Service

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ENERGY FACTS

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Michigan State University

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Conserving Energy in Home Hot Water Use¹

ABOUT 20 PERCENT of the total energy consumed in the United States is used directly in the home; and of that 20 percent, more than 60 percent is used in space heating and air conditioning. However, water heating is the next biggest user as is shown in Table 1.

Because water heating consumes about 15 percent of the energy used in the home, conserving hot water can result in energy savings. The following suggestions can help you reduce the amount of energy you use to heat water in your home.

THE HOT WATER HEATER

Some uses of hot water only need a temperature of 100°F.; however, 140°F. water is recommended for washing dishes in a dishwasher and for washing certain clothes. For these reasons, it is wise to keep the water heater set at 140 F. Lowering the temperature would save money, but there are other ways to do this.

A study for the National Science Foundation estimates that 20 to 30 percent of the heat used by a water heater is lost through the insulation around the tank. Increasing the insulation on gas-fired or oil-fired heaters from the normal 1 inch to 4 inches could result in a savings of 21 percent. For electric water heaters, increasing the insulation thickness from the normal 2 inches to 3 inches could result in a savings of about 5 percent. In buying a new water heater be sure to find out about the amount of insulation because this will affect your future cost of heating water.

One caution when adding insulation to an existing oil- or gas-fired water heater is to have a good pressure-relief valve. A pilot light continues to heat water, so if no hot water is drawn for a long period of time, the water may be overheated.

Electricity is cheaper to produce in "off-peak" times—which are generally evenings and nights—

and some utility companies have lower rates during these hours. If yours does, schedule large uses of hot water during off-peak periods. Some families do hot-water washing in the evening or turn on the dishwasher before they go to bed.

Table 1. Annual Energy Use in the Home.

Energy Use	Average % per residence
Space heating	57.7
Water heating	14.9
Refrigeration	6.0
Small appliances	5.8
Cooking	5.0
Air conditioning	3.7
Television	3.0
Food freezing	1.9
Clothes drying	1.7

INSULATING PIPES

When hot water is wanted at a faucet, cold water in the pipes must be drawn before the hot water comes. Then, when the water is shut off the hot water in the pipe cools off so that heat is lost. This loss can be reduced by: (1) locating the water heater close to where the heaviest use occurs (this reduces the length of pipes); and (2) insulating the hot water pipes by wrapping with insulation.

AMOUNT OF WATER USED

Table 2 shows the amount of water and energy used in a typical home. The suggestions that follow may help you find ways to cut your own use.

Hot Water for Laundering

Changing from hot water wash and warm rinse to warm wash and cold rinse can save about half the energy used in laundering. Hot water wash may be

¹By James S. Boyd, Professor, Agricultural Engineering, and Human Environment and Design; and Anne Field, Assistant Professor, Family Ecology.

needed to clean items with heavy or greasy soils, but cold water can always be used for rinsing. Suds savers let you recycle hot water for a second load. Doing only full loads, or adjusting water levels to size of load, cuts hot water waste. (For more information, see MSU Cooperative Extension Bulletin E-1121, Energy Fact Sheet No. 4, *Saving Energy and Doing the Laundry*.) You could save enough energy to run a 16-cubic-foot freezer for a year by adjusting wash and rinse temperatures.

Hot Water for Washing Dishes

Hot water is necessary to clean and sanitize dishes. A dishwasher uses 13 to 16 gallons, all hot, for a normal cycle. By running it only when full, and by avoiding extra cycles, you use hot water most efficiently and save energy and money. You can get by with a little less hot water if you wash dishes by hand once a day and **wash and rinse in dishpans or stoppered sink basins**. But if you rinse under a running faucet, you can use twice as much hot water as in the dishwasher. Stop before you reach for the hot water faucet to rinse dishes before washing. Develop the habit of scraping them, and using cold water if prerinsing is needed.

Hot Water for Bathing

Depending on your personal habits, you may use 15 to 25 gallons of water for a bath. Or, you may use only 3 or 4 gallons for a frugal shower—one in which you turn off the water as you soap and scrub. But if you tend to take extended showers, you may use more than 25 gallons of water. An easy way to check whether your showers use more or less water than tub baths is to put the stopper in the tub the next time you shower.

Of course, bathing water isn't as hot as the water for laundering or dishwashing—100°F. is warm. For this reason, bath water isn't as expensive to heat as water for other purposes.

The amount of hot or cold water can also be controlled by using flow control valves in water lines. These can be bought at plumbing supply stores.

A water-conserving shower head saves energy and water. A 10-minute shower using a flowrate of 3 to 6 gallons per minute will use from 30 to 60 gallons of warm water. A low-flow shower head allows about 2 gallons per minute, or 20 gallons of warm water.

Each of these suggestions may save only a little energy, but together they can have a significant effect on the cost for heating water.

Table 2. Home Hot Water Energy Use Estimates.*

	Times used		Energy in BTU		Electric water heater	Gas water heater
	per year	per use	per year	per year	in KWH†	in cu. ft.†
Washer						
Regular capacity	400	7,900	3,200,000		1,000	4,400
Large capacity	360	24,000	8,500,000		2,750	12,000
Dishwasher	400	10,000	4,080,000		1,300	5,700
Bath						
Minimum	600	7,200	4,200,000		1,400	5,900
Liberal	600	12,000	7,200,000		2,700	10,000
Shower						
Minimum	600	1,400	864,000		280	1,200
Liberal	600	12,000	7,200,000		2,700	10,000
Hot water leak	360 (per day)	6,800 (per day)	2,500,000		800	3,500

Assumptions:

- Based on typical use for family of 4.
- Adjusted for water heater efficiency.
- If ½ washers are hot wash, warm rinse and ¼ are warm wash, warm rinse.
- Seven loads of wash per week.
- About 3 baths or showers per person per week.

*From "Energy in the Home," by Sandra Shank, Purdue University.

†Check your local utility rates to figure costs.